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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,276	04/01/2004	Paul Michael McAllister	TH-2306 02 (US) HS:KNL	8372

23632 7590 09/29/2008

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EXAMINER	
BOYER, RANDY	
ART UNIT	**PAPER NUMBER**
1797	
MAIL DATE	**DELIVERY MODE**
09/29/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/815,276	MCALLISTER ET AL.	
	Examiner	Art Unit	
	RANDY BOYER	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,8-14,19,21-23,27-33 and 37-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-14,19,21-23,27-33 and 37-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office Action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 28 August 2008 has been entered.

Response to Amendment

2. Examiner acknowledges Applicant's response filed 28 August 2008 containing remarks.

3. Claims 1-4, 8-14, 19, 21-23, 27-33, and 37-43 are pending.

4. The previous rejections of claims 1-4, 8-14, 19, 21-23, 27-33, and 37-43 under 35 U.S.C. 103(a) are maintained. The rejections follow.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which

> said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-4, 8-14, 19, 21-23, 27-33, and 37-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamura (US 4,645,754) in view of Saito (US 4,511,671). Alternatively, claims 1-4, 8-14, 19, 21-23, 27-33, and 37-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamura (US 4,645,754) in view of Saito (US 4,511,671), as evidenced by Murphy (US 4,358,623).

9. With respect to claim 1, Tamura discloses a reactor system for the oxidation of ethylene to ethylene oxide comprising: an elongated tube, having a reaction zone

defined by a tube length and a tube diameter, wherein the tube diameter may be greater than 28 mm (see Tamura, column 13, lines 58-60); wherein contained within the reaction zone is a packed bed of shaped support material (see Tamura, Figs. 7-12); and wherein the shaped support material has a hollow cylinder geometric configuration (see Tamura, Figs. 7-12) defined by a nominal length, an outside diameter and an inside diameter such that the ratio of the length to the outside diameter is in the range of from about 0.5 to about 2 (see Tamura, column 12 (Example 3, Control 1)), and further such that the ratio of the outside diameter to the inside is about 2.3 (see Tamura, column 12 (Example 3, Control 1)), and the ratio of the tube diameter to the outside diameter is in the range of from about 2 to about 10 (see Tamura, column 11, lines 51-53; and column 12 (Example 3, Control 1)).

Tamura does not explicitly disclose wherein the ratio of the outside diameter to the inside diameter exceeds about 2.7; or wherein the outside diameter is in the range of from about 7.4 mm to about 11.6 mm.

However, Saito discloses a process for the catalytic vapor phase oxidation of isobutylene over a hollow cylinder catalyst support (i.e. the same type used by Tamura), wherein the ratio of outside diameter to inside diameter exceeds about 2.7 (see e.g. Tamura, column 2, lines 17-20; and Example 4) and wherein the outside diameter is in the range of from about 7.4 mm to about 11.6 mm (see Saito, column 2, lines 17-20; and Example 5). Saito explains that by using catalysts having the disclosed dimensions, it is possible to reduce the catalyst particle and increase the geometric surface area thereby achieving a higher catalyst activity and a higher yield (see Saito,

column 2, lines 46-50). Saito also notes a reduced pressure drop across a bed of catalysts comprising his disclosed dimensions (see Saito, column 1, lines 29-32; and column 2, lines 58-62).

Therefore, the person having ordinary skill in the art of reactor systems for the oxidation of ethylene would have been motivated to use catalyst support materials of the type disclosed by Saito in the process of Tamura in order to achieve higher catalyst activity and higher yield while maintaining a reduced pressure drop across the catalyst bed.

Finally, the person having ordinary skill in the art of reactor systems for the oxidation of ethylene would have had a reasonable expectation of success in using the catalyst support materials of Saito in the process of Tamura because: (1) both Tamura and Saito are directed to the vapor phase oxidation of olefins (alkenes); (2) both Tamura and Saito disclose the use of hollow cylinder catalyst support materials; (3) Tamura notes a concern with high pressure losses associated with the use of hollow cylinder catalyst support materials (see Tamura, column 3, lines 29-40); and (4) Saito discloses hollow cylinder catalyst support materials formed with specific dimensions that would alleviate the pressure drop concerns noted by Tamura.

10. With respect to claims 2 and 3, Tamura discloses wherein the tube diameter may be about 33 mm (see Tamura, column 13, lines 58-60); and Saito discloses wherein the ratio of outside diameter to inside diameter is in the range of from about 3.3 to about 10 (see Saito, Example 4).

11. With respect to claim 4, the court has held that where the only difference between the prior art and the claims at issue are a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform any differently than the prior art device, the claimed device is not patentably distinct from that of the prior art. See MPEP § 2144.04 (IV)(A) (citing *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338 (Fed. Cir. 1984)).

12. With respect to claim 8, Tamura discloses wherein the tube length may be 10 meters (see Tamura, column 13, lines 58-60).

13. With respect to claim 9, Saito discloses wherein the reaction tube is *filled* with catalyst having a hollow cylindrical geometric configuration (see Saito, column 4, lines 21-22).

14. With respect to claims 10 and 11, Tamura discloses wherein the ratio of tube diameter to outside diameter is in the range of from about 3 to about 5 (see Tamura, column 11, lines 51-53; and column 12 (Example 3, Control 1)).

15. With respect to claims 12-14, Tamura discloses wherein the shaped support material comprises predominantly alpha-alumina (see Tamura, column 5, lines 53-59), and the packed bed has a tube packing density of greater than about 550 kg per cubic meter (see Tamura, Table 1); and wherein the shaped support material supports silver as a catalytic component (see Tamura, Example 1; and Example 3 (Control 1)).

16. With respect to claim 19, Tamura discloses a reactor system for the oxidation of ethylene to ethylene oxide comprising: an elongated tube, having a reaction zone defined by a tube length and a tube diameter, wherein the tube diameter may be greater

than 28 mm (see Tamura, column 13, lines 58-60); wherein contained within the reaction zone is a packed bed of shaped support material (see Tamura, Figs. 7-12); and wherein the shaped support material has a hollow cylinder geometric configuration (see Tamura, Figs. 7-12) defined by a nominal length, an outside diameter and an inside diameter such that the ratio of the length to the outside diameter is in the range of from about 0.5 to about 2 (see Tamura, column 12 (Example 3, Control 1)), and further such that the ratio of the outside diameter to the inside is about 2.3 (see Tamura, column 12 (Example 3, Control 1)), and the ratio of the tube diameter to the outside diameter is in the range of from about 2 to about 10 (see Tamura, column 11, lines 51-53; and column 12 (Example 3, Control 1)).

Tamura does not explicitly disclose wherein the ratio of the outside diameter to the inside diameter exceeds about 2.7; wherein the outside diameter is in the range of from about 7.4 mm to about 11.6 mm; or wherein the ratio of the nominal outside diameter to the nominal inside diameter provides a positive test, wherein “positive test result” is defined by a decrease of the quotient of a numerical value of the pressure drop per unit length of the packed bed and a numerical value of the packing density, which numerical values are obtained by testing the packed bed in a turbulent flow of nitrogen gas at a pressure of 1.136 MPa (150 psig), relative to a comparison quotient of numerical values obtained in an identical manner, except that the hollow cylinder geometric configuration of the same support material is defined by a nominal outside diameter of 8 mm and a nominal inside diameter of 3.2 mm, and a ratio of the nominal length to the nominal outside diameter of 1.

However, Saito discloses a process for the catalytic vapor phase oxidation of isobutylene over a hollow cylinder catalyst support (i.e. the same type used by Tamura), wherein the ratio of outside diameter to inside diameter exceeds about 2.7 (see e.g. Tamura, column 2, lines 17-20; and Example 4), and wherein the outside diameter is in the range of from about 7.4 mm to about 11.6 mm (see Saito, column 2, lines 17-20; and Example 5). Saito explains that by using catalysts with the disclosed dimensions, it is possible to reduce the catalyst particle and increase the geometric surface area thereby achieving a higher catalyst activity and a higher yield (see Saito, column 2, lines 46-50). Saito also notes a reduced pressure drop across a bed of catalysts comprising his disclosed dimensions (see Saito, column 1, lines 29-32; and column 2, lines 58-62). Moreover, it is known in the art that pressure drop across a packed bed is a function of packing density (see e.g. Murphy (US 4,358,623), column 3, lines 50-53). In other words, packing density is a "result-effective variable," changes in which will necessarily result in corresponding changes in pressure drop per unit length of a packed bed. Therefore, Examiner finds Applicant's limitation "wherein the ratio of the nominal outside diameter to the nominal inside diameter provides a positive test, wherein 'positive test result' is defined by a decrease of the quotient of a numerical value of the pressure drop per unit length of the packed bed and a numerical value of the packing density, which numerical values are obtained by testing the packed bed in a turbulent flow of nitrogen gas at a pressure of 1.136 MPa (150 psig), relative to a comparison quotient of numerical values obtained in an identical manner, except that the hollow cylinder geometric configuration of the same support material is defined by a nominal outside

diameter of 8 mm and a nominal inside diameter of 3.2 mm, and a ratio of the nominal length to the nominal outside diameter of 1" to be of no patentable consequence since a person having ordinary skill in the art and having an appreciation for Tamura could easily meet such limitation through mere routine experimentation. See MPEP § 2144.05(II).

Therefore, the person having ordinary skill in the art of reactor systems for the oxidation of ethylene would have been motivated to use catalyst support materials of the type disclosed by Saito in the process of Tamura in order to achieve higher catalyst activity and higher yield while maintaining a reduced pressure drop across the catalyst bed.

Finally, the person having ordinary skill in the art of reactor systems for the oxidation of ethylene would have had a reasonable expectation of success in using the catalyst support materials of Saito in the process of Tamura because: (1) both Tamura and Saito are directed to the vapor phase oxidation of olefins (alkenes); (2) both Tamura and Saito disclose the use of hollow cylinder catalyst support materials; (3) Tamura notes a concern with high pressure losses associated with the use of hollow cylinder catalyst support materials (see Tamura, column 3, lines 29-40); and (4) Saito discloses hollow cylinder catalyst support materials formed with specific dimensions that would alleviate the pressure drop concerns noted by Tamura.

17. With respect to claims 21 and 22, Tamura discloses wherein the tube diameter may be about 33 mm (see Tamura, column 13, lines 58-60); and Saito discloses

wherein the ratio of outside diameter to inside diameter is in the range of from about 3.3 to about 10 (see Saito, Example 4).

18. With respect to claim 23, the court has held that where the only difference between the prior art and the claims at issue are a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform any differently than the prior art device, the claimed device is not patentably distinct from that of the prior art. See MPEP § 2144.04 (IV)(A) (citing *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338 (Fed. Cir. 1984)).

19. With respect to claim 27, Tamura discloses wherein the tube length may be 10 meters (see Tamura, column 13, lines 58-60).

20. With respect to claim 28, Saito discloses wherein the reaction tube is *filled* with catalyst having a hollow cylindrical geometric configuration (see Saito, column 4, lines 21-22).

21. With respect to claims 29 and 30, Tamura discloses wherein the ratio of tube diameter to outside diameter is in the range of from about 3 to about 5 (see Tamura, column 11, lines 51-53; and column 12 (Example 3, Control 1)).

22. With respect to claims 31-33, Tamura discloses wherein the shaped support material comprises predominantly alpha-alumina (see Tamura, column 5, lines 53-59), and the packed bed has a tube packing density of greater than about 550 kg per cubic meter (see Tamura, Table 1); and wherein the shaped support material supports silver as a catalytic component (see Tamura, Example 1; and Example 3 (Control 1)).

23. With respect to claims 37-43, Applicant's claimed dimensions for the hollow cylinder support's outside and inside diameters all lie within or touch the disclosed range of dimensions for Saito's hollow cylinder support (see Saito, column 2, lines 17-20). In this regard, Examiner notes that when claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists. See MPEP § 2144.05 (I) (citing *In re Wertheim*, 541 F.2d 257 (CCPA 1976)).

Response to Arguments

24. Applicant's arguments filed 28 August 2008 have been fully considered but they are not persuasive.

25. Examiner understands Applicant's principal arguments to be:

I. The skilled person would not have been motivated to use the catalyst support materials of the shape disclosed in Saito in the ethylene epoxidation process of Tamura in order to achieve higher catalyst activity and higher yield since Saito is a diffusion-limited reaction system with different considerations than the ethylene epoxidation reaction system.

II. The skilled person would not have been motivated to use the catalyst support materials of the type disclosed in Saito in the ethylene epoxidation process of Tamura in order to maintain a reduced pressure drop across the catalyst bed since the improved pressure drop discussed in Saito is in comparison to solid spheres or cylinders and not the saddles of Tamura.

III. The person skilled in the art would not be motivated to combine Tamura and Saito as they are directed to different reaction systems.

IV. Tamura clearly teaches away from using hollow cylinders. Thus, the person skilled in the art would not have been motivated to use the hollow cylinder catalyst support materials of Saito to alleviate the pressure drop concerns noted by Tamura.

26. With respect to Applicant's first argument, Tamura discloses wherein catalyst support materials of the shape disclosed in Saito (i.e., hollow cylinders or Raschig rings) may be used in his process (see Tamura, Examples).

27. With respect to Applicant's second argument, Examiner considers such argument irrelevant since Saito discloses other bases for motivation to use the specific catalyst shape of his invention, namely the possibility for reduction in catalyst size, increase in geometrical surface area, with correspondingly higher activity and higher yield (see Saito, column 2, lines 46-50).

28. With respect to Applicant's third argument, Examiner notes that both Tamura and Saito are directed to organic vapor phase oxidation reactions.

29. With respect to Applicant's fourth argument, Examiner submits that references "teach away" only when the proposed combination of references would render the base reference (in this case, Tamura) inoperable for its intended purpose. *See generally*, *McGinley v. Frankling Sports, Inc.*, 262 F.3d 1339 (Fed. Cir. 2001). In this regard, Examiner notes that Tamura does express an explicit preference for Intalox or Berl saddle catalyst supports rather than Raschig ring supports (see Tamura, column 3, lines 31-40; and column 4, lines 35-45). Nevertheless, however, Tamura's Examples (see Example 3, Controls 1 and 2; Example 8, Controls 6 and 8; and Example 12, Controls 11 and 13) show that catalyst supports in the shape of Raschig rings are suitable for

use in his process, even if not preferred – i.e. use of Raschig rings support would *not* destroy the operability of Tamura's process. Indeed, Examiner notes that in some cases, Tamura's own results show that Raschig ring supports perform comparable (or even superior) in terms of catalyst selectivity pressure loss when compared to the preferred Intalox and Berl saddle catalyst supports (see e.g., Tamura, Table 2, Control 8) (showing *higher* selectivity and *lower* pressure loss achieved with a Raschig ring support than was obtained with an Intalox saddle support (Example 8) for the same reaction conditions)).

Conclusion

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Boyer whose telephone number is (571) 272-7113. The examiner can normally be reached Monday through Friday from 10:00 A.M. to 7:00 P.M. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola, can be reached at (571) 272-1444. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RPB

/Glenn A Caldarola/

Acting SPE of Art Unit 1797